

This listing of claims will replace all prior versions, and listings, of claims in the application.<sup>[11]</sup>

**Listing of Claims:**

1. (Currently Amended) A method for analyzing access to a data communication network by a user, comprising:

tracing traffic of said user via a computer, and identifying a group of networks with which said traffic is mainly handled, by defining relative autonomous systems and tracing the sequence of autonomous systems crossed by said traffic; the tracing including:

- a first stage, to provide a list of paths of autonomous systems crossed by said traffic to reach each destination, and

- a second stage, to aggregate elaborate said list of paths, outputting a tree representing all the paths of the autonomous systems crossed by the traffic of said user to reach each destination,

wherein said first stage comprises the operations of inputting a file containing the IP addresses representing the sites most frequently visited by said user and performing a traceroute function for each destination site, by tracing the path to reach each destination site via a transmission of a traceroute message at a configurable frequency, and

wherein said second stage comprises providing, in relation to the list of said autonomous systems crossed by said traffic of said user, at least one parameter including a percentage of use of the autonomous systems.

2. (Previously Presented) A method as per claim 1, comprising determining the routing of said traffic on branches of said tree, and associating respective indicative values of the traffic that crosses the branches of said tree.

3. (Previously Presented) A method as per claim 1, comprising using hardware probes to trace the traffic of said user.

4. (Previously Presented) A method as per claim 3, comprising configuring said hardware probes to provide information selected from a group including: band use of an individual link, data volume, protocol-subdivision, IP address-subdivision, traffic matrix between the user and the network.
5. (Previously Presented) A method as per claim 3, comprising configuring said hardware probes to determine at least one item selected from a group including: sites most frequently visited by the user, main networks to which the user addresses traffic, and the origin of who connects up to said user.
6. (Previously Presented) A method as per claim 1, comprising setting software agents on the data communication network access routers to trace said user traffic.
7. (Previously Presented) A method as per claim 6, comprising configuring said software agents to trace the traffic through the interface of the router of said user to determine the main traffic lines.
8. (Previously Presented) A method as per claim 6, comprising configuring said software agents to analyze the operating status of the respective router in terms of CPU load and available memory.
9. (Previously Presented) A method as per claim 6, comprising providing a target machine for the transfer of the statistics obtained by said routers.
10. (Previously Presented) A method as per claim 1, comprising generating, as the result of said traffic tracing operation of said user, at least one parameter selected from a group including: destination networks of said traffic, percentage of traffic involved, and pertinent autonomous system.
11. (Canceled)
12. (Previously Presented) A method as per claim 11, comprising tracing said path as a sequence of autonomous systems crossed.

13. (Previously Presented) A method as per claim 11, wherein in said first stage said tracing operations are carried out repeatedly with a given frequency.

14. (Previously Presented) A method as per claim 13, wherein said frequency is configured to be determined and selected.

15. (Previously Presented) A method as per claim 1, wherein said second stage comprises generating a unique tree of paths of the autonomous systems crossed by the traffic of said user to reach all the destinations, wherein leaves of said tree are indicative of destination subnetworks of the traffic of said user.

16. (Previously Presented) A method as per claim 1, wherein the provided at least one parameter further includes at least one of a time value for passing through said autonomous systems and a hops value inside the autonomous system.

17. (Previously Presented) A method as per claim 16, wherein said provided at least one parameter is expressed as an average value.

18. (Previously Presented) A method as per claim 1, wherein said first stage comprises the operation of invoking for each IP address generated via said trace function, a remote service to obtain at least one item of information from a group including: name of the autonomous system to which the generated IP address belongs and the number of the autonomous system to which said generated IP address belongs.

19. (Previously Presented) A method as per claim 18, wherein said remote service is the *whois* service of the databases RIBE, ARIN, APNIC.

20. (Previously Presented) A method as per claim 1, wherein said first stage comprises generating a data file including information selected from a group including:

- order number of the autonomous system following the sequence of IP addresses provided by said trace function,

- text name of the autonomous system,

- identification number of the autonomous system,

- number of hops that a single tracing command has measured inside the autonomous system,

and

- time of permanence in the autonomous system measured by a single tracing command.

21. (Previously Presented) A method as per claim 1, comprising performing a plurality of said tracing functions in parallel during said first stage.

22. (Previously Presented) A method as per claim 1, wherein said second stage comprises storing information of correspondence between IP addresses and data relating to the autonomous systems.

23. (Previously Presented) A method as per claim 1, wherein said second stage comprises generating leaves of said tree as an identification of destination subnetworks of the traffic of said user and relative branches as identifications of the autonomous systems crossed by the traffic.

24. (Previously Presented) A method as per claim 1, wherein said second stage is performed in association with a central memory with a data structure that represents the paths generated in said first stage in the form of at least one aggregated list.

25. (Previously Presented) A method as per claim 24, wherein said at least one aggregated list is identified as representing a variable number of autonomous system lists that share a common maximum prefix.

26. (Currently Amended) An apparatus for analyzing access to a data communication network by a user, comprising:

a processor; and

memory storing software code that, when executed by the processor, performs:

tracing traffic of said user;

identifying a group of networks with which the traffic is mainly involved by identifying relative autonomous systems and tracing the sequence of autonomous systems crossed by said traffic;

providing a list of paths of autonomous systems crossed by said traffic to reach each destination;

aggregately elaborating said list of paths by outputting a tree representing all the paths of the autonomous systems crossed by the traffic of said user to reach each destination;

providing, in relation to the list of said autonomous systems crossed by said traffic of said user, at least one parameter including a percentage of use of the autonomous systems; and

inputting a file containing IP addresses representing destination sites most frequently visited by said user and to perform a tracing operation for each destination site, by tracing the path to reach each destination site via a transmission of a traceroute message at a configurable frequency.

27. (Previously Presented) An apparatus as per claim 26, wherein the apparatus is configured to measure the routing of said traffic on branches of said tree and associate respective indicative values of the traffic crossing the branches to the branches of said tree.

28. (Previously Presented) An apparatus as per claim 26, comprising hardware probes to trace the traffic of said user.

29. (Previously Presented) An apparatus as per claim 28, wherein said hardware probes are configured to supply information selected from a group including: use of single link band, data

volume, protocol-subdivision, IP address-subdivision, traffic matrix between the user and the network.

30. (Previously Presented) An apparatus as per claim 28, wherein said hardware probes are configured to determine at least one item selected from a group including: sites most frequently visited by the user, main networks addressed by the user traffic, and origin of those who connect up to said user.

31. (Previously Presented) An apparatus as per claim 26, comprising software agents on a data communication network access router to trace said traffic of the user.

32. (Previously Presented) An apparatus as per claim 31, wherein said software agents are configured to trace the traffic through the interface of the router of said user by determining main traffic lines.

33. (Previously Presented) An apparatus as per claim 31, wherein said software agents are configured to perform an analysis on the operating status of the respective router in terms of CPU load and available memory.

34. (Previously Presented) An apparatus as per claim 31, comprising a target machine for receiving statistics obtained by said routers.

35. (Previously Presented) An apparatus as per claim 26, wherein the apparatus is configured to generate as a result of said tracing operation of the traffic of said user at least one parameter selected from a group including: destination networks of said traffic, percentage of traffic involved, pertinent autonomous system.

36. (Canceled)

37. (Previously Presented) An apparatus as per claim 36, wherein said apparatus is configured to trace said path as a sequence of autonomous systems that are crossed.

38. (Previously Presented) An apparatus as per claim 36, wherein said apparatus is configured to repeatedly perform said tracing operations with a given frequency.

39. (Previously Presented) An apparatus as per claim 38, wherein said apparatus is configured so that said frequency can be determined and selected.

40. (Previously Presented) An apparatus as per claim 26, wherein said apparatus is configured to output a unique tree of autonomous systems paths crossed by the traffic of said user to reach all the destinations, and wherein leaves of said tree are indicative of destination subnetworks of the traffic of said user.

41. (Previously Presented) An apparatus as per claim 26, wherein the provided at least one parameter further includes at least one of a value of time of permanence inside said autonomous systems and a value of hops inside said autonomous systems.

42. (Previously Presented) An apparatus as per claim 41, wherein the provided at least one parameter is expressed as an average value.

43. (Previously Presented) An apparatus as per claim 26, wherein said apparatus is configured to invoke for each IP address generated via said tracing a remote service to obtain at least one piece of information from a group including: name of the autonomous system to which the generated IP address belongs and number of the autonomous system to which the generated IP address belongs.

44. (Previously Presented) An apparatus as per claim 43, wherein said remote service is the *whois* service of the databases RIBE, ARIN, APNIC.

45. (Previously Presented) An apparatus as per claim 26, wherein said apparatus outputs a data file including information selected from a group including:

- order number of the autonomous system following the sequence of the IP addresses provided by said tracing function,
  - text name of the autonomous system,
  - identification number of the autonomous system,
  - number of hops that a single tracing command has measured inside the autonomous system,
- and
- time of permanence in the autonomous system measured by a single tracing command.

46. (Previously Presented) An apparatus as per claim 26, wherein said apparatus is configured to perform in parallel a plurality of said tracing functions.

47. (Previously Presented) An apparatus as per claim 26, wherein said apparatus contains a cache memory to store information of correspondence between IP addresses and data relating to the autonomous systems.

48. (Previously Presented) An apparatus as per claim 26, wherein said apparatus is configured so that leaves of said tree are destination subnetworks of the traffic of said user and relative branches of said tree are the autonomous systems crossed by the traffic.

49. (Previously Presented) An apparatus as per claim 26, wherein said apparatus is associated to one central memory with a data structure that represents the paths generated by said apparatus in the form of at least one aggregated list.



50. (Previously Presented) An apparatus as per claim 49, wherein said at least one aggregated list is identified as representing a variable number of autonomous system lists that share a common maximum prefix.

51. (Currently Amended) A memory having stored thereon software code that, when executed, performs:

tracing traffic associated with a user of a data communication network;  
identifying a group of networks with which said traffic is mainly handled; and  
defining relative autonomous systems and tracing the sequence of autonomous systems crossed by said traffic,

wherein the tracing includes:

- a first stage, to provide a list of paths of autonomous systems crossed by said traffic to reach each destination, and

- a second stage, to aggregately elaborate said list of paths, outputting a tree representing all the paths of the autonomous systems crossed by the traffic of said user to reach each destination,

wherein said first stage comprises the operations of inputting a file containing the IP addresses representing the sites most frequently visited by said user and performing a traceroute function for each destination site, by tracing the path to reach each destination site via a transmission of a traceroute message at a configurable frequency, and

wherein said second stage comprises providing, in relation to the list of said autonomous systems crossed by said traffic of said user, at least one parameter including the percentage of use of the autonomous systems.